

# Patient Data Collection Software Utility

## V2.X

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950-410

Utility Software for Balance System™ SD, BioSway™ and Gait Trainer™ 3

950-400

950-402

950-406

950-385

950-379

950-380

950-300

950-441

950-444

950-460

950-461

**Biodes - Patient Data Collection Software Utility**

Patient Information		Update	Data Export	Serial
Patient Name	09876	Delete	Export	
Patient Gender	Male	Import		
Patient Age	17	Save		
Patient Memo				

scott (PatientID=609)

- Balance System (PST) 10/12/2012 10:31 AM Age:55 Height:59"-65"
- Balance System (LOS) 10/12/2012 10:35 AM Age:55 Height:59"-65"
- Balance System (CTSIB) 10/12/2012 10:45 AM Age:46 Height:59"-65"
- Balance System (WSTR) 10/12/2012 10:47 AM Age:45 Height:59"-65"
- Balance System (WSTR) 10/12/2012 10:48 AM Age:45 Height:59"-65"
- Balance System (LOS) 10/23/2012 8:30 AM Age:51 Height:59"-65"
- Balance System (%WBTR) 1/22/2013 2:46 PM Age:55 Height:59"-65"

shahidul mahfuz (PatientID=539)

- Gait Trainer 1/1/2003 12:03 AM Age:36 Height:65" - 73"

SMG (PatientID=547)

- Balance System (CTSIB) 1/7/2012 1:23 PM Age:14 Height:53"-59"

staci (PatientID=605)

- Balance System (FRT) 12/12/2011 3:10 PM Age:27 Height:< 53"

t (PatientID=553)

- Balance System (CTSIB) 2/7/2012 3:30 PM Age:31 Height:59"-65"
- Balance System (CTSIB) 2/18/2013 10:44 AM Age:34 Height:73+"

todd (PatientID=614)

- Balance System (PST) 2/18/2013 10:39 AM Age:34 Height:73+"

tom e (PatientID=599)

Context Menu:

- Collapse All Ctrl+C
- Expand All Ctrl+E
- Delete Del
- Delete All

Results Log to file Setup About Close

# BIODEX

Biodes Medical Systems, Inc.

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**Test results exported from the following product are compatible with this version of patient data collection:**

950-400	Gait Trainer 3, 115V - Includes Support Bar
950-402	Gait Trainer 3, 115V - Includes Extended Handrails
950-406	Gait Trainer 3, 115V - Includes Geriatric/Pediatric Handrails
950-385	Gait Trainer 2, 115V - Includes Support Bar
950-379	Gait Trainer 2, 115V - Includes Extended Handrails
950-380	Gait Trainer 2, 115V - Includes Geriatric/Pediatric Handrails
950-300	Balance System SD 115V (12.1" LCD)
950-441	Balance System SD 230V (12.1" LCD)
950-444	Balance System SD 100V (12.1" LCD)
950-460	BioSway and Case 115V/230V (12.1" LCD)
950-461	BioSway 115V/230V (12.1" LCD)

This manual covers operation procedures for Patient Data Collection Software Utility, V 2.X.

This version of the software is compatible with Win CE 12" Display with USB and Serial Interface, running 2.X Gait Trainer software or 3.X Balance SD and BioSway Software.



**Need Help?**

Contact Biodex Software Support  
1-800-224-6339 ext 2120, or

[softwaresupport@biodex.com](mailto:softwaresupport@biodex.com)

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# 1. Introduction

The functionalities of Patient Data Collection Software Utility (PDC) include:

1. Data Archive/ View/ Print: This function is a means to archive patients and their tests that were stored on the Gait Trainer, Balance SD or BioSway. All data for each device is stored in folders for each specific patient for archiving, reporting or exporting as a Comma Separated Value (.csv) file.
2. Multiple data export: This feature allows data to be exported as a .csv file which can then be used to create normative data. It does not contain the “raw” coordinate data points. The user can choose a test type and then export all records of that test to a single .csv file.
3. Raw coordinate data: This software also allows exporting of individual test data as a .csv file with “raw” coordinate data.
4. Portability: Patient test data can be exported to a USB flash drive as a .bio file from Gait Trainer, Balance SD or BioSway (12” WinCE displays only). This .bio file can then be imported into the PDC program. The same .bio file can be imported to other computers also running the PDC program, if necessary.
5. Reports: Test results can be viewed, printed and stored as PDFs. This should aid in compatibility with various Electronic Medical Records (EMR) systems.
6. Serial Import: The patient data can be easily transferred from the Gait Trainer, Balance or BioSway display via USB flash drive or a serial interface for products with the 12” WinCE displays.

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## 2. What's new/changes in this version

Patient Data Collection Software Utility (PDC) Version 2.X has both new features and some functionality / configuration changes from the previous version of the software.

### New features:

1. G-Code feature:
  - G-Code reporting feature on the Balance and Gait displays.
  - New entry fields for ICD 9 Code and Diagnosis information
2. New test types:
  - BESS test
  - Custom Sensory Integration Protocol (SIB-C) tests
3. Report Preview option: Reports are now viewed directly in the PDC program - no need to use a separate browser. You will find reports have a look and feel consistent with the software, and printing reports is easy as well – just press the print button. You will have the option to select between Browser and PDC preview in Setup screen.
4. Multiple record exports on a single .csv file.
  - The PDC user will be able to export multiple records of data for each type of test/training. This is applicable for the Balance devices' Test/Training modes and also for Exercise sessions on the Gait Trainer.
  - Users can export all of the records of patients for SIB-C tests to a single.csv file. File format (column header) will vary depending on the test/training type.
5. Normative data import: When data is exported from a Balance system to USB flash drive, it also creates an .nrm file (in addition to .bio, which is the main test data file) that stores the normative data for CTSIB, BESS and SIB-C tests. When the user exports test records from the display and imports those records into the PDC program, the normative data will match.
  - **NOTE:** *If the PDC program does not find the matching .nrm file in the imported data when the test records are exported to USB and imported to the PDC program, it will fall back and use the normative data file (PDCollection.ini) of the PDC program.*
  - *Also, during the serial export to PDC from display, each test data set (CTSIB, BESS, and SIB-C) will have the normative data associated with it.*

### Changes from previous version:

1. On the Setup screen, the report view option has been changed from Browser to Built-in preview option.
2. On the main screen, the “CTSIB” button has been changed to “Export”, which allows more test/training types to be exported.
3. Users can now sort the “tree” view by Patient Name.

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## 3. Requirements, Installation and Setup

### Computer Requirements

1. Windows XP or Windows 7
2. Either Serial COM port and/or USB port

### Data Transfer Method

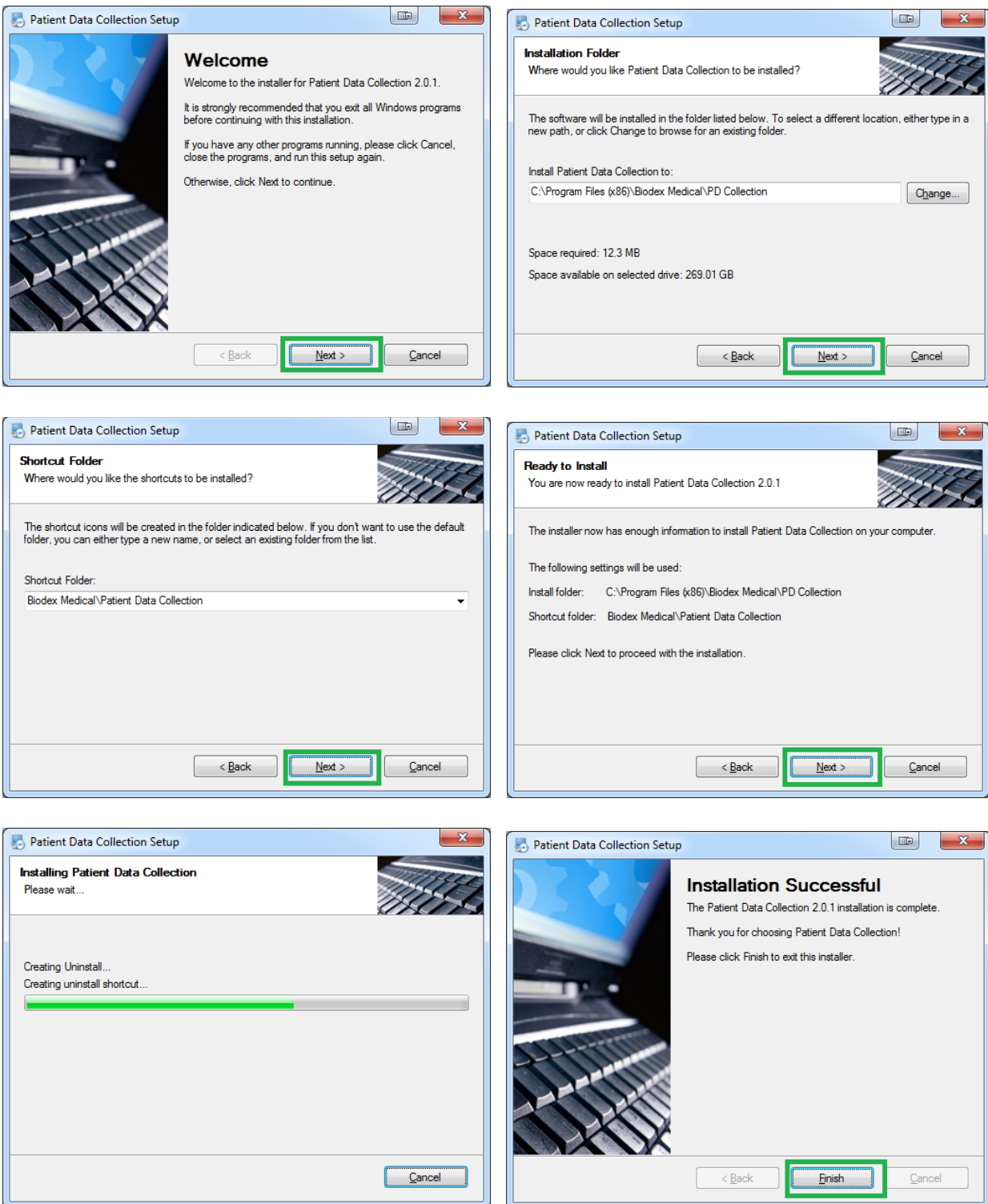
1. The preferred and simplest data transfer method is to use a USB flash drive for 12" WinCE displays. Simply move data files between the display and the computer with the Patient Data Collection Software Utility (PDC).
2. An alternative method would be to use a serial port connection, both sides: Connect the male DB 9 to the female DB 9 serial connector on the Balance System SD, BioSway or Gait Trainer display. Connect the Female DB 9 to the available serial connector on the computer. If no Com port is available on the computer, or you prefer to use a USB connection, then the USB to serial converter must be used. Follow the instructions provided with the USB Serial Converter to install the required drivers on the computer.

### Software Installation

1. The software is available as a free download on [www.biodex.com](http://www.biodex.com)  
Look for "Software Updates", and then follow the download instructions.

#### To install the software:

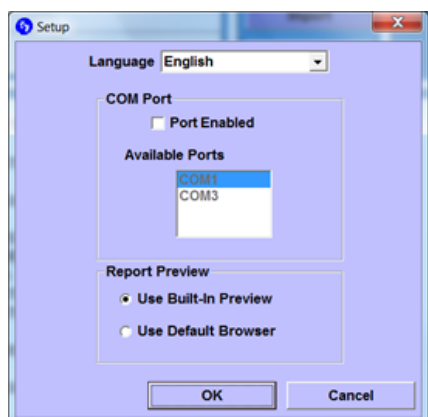
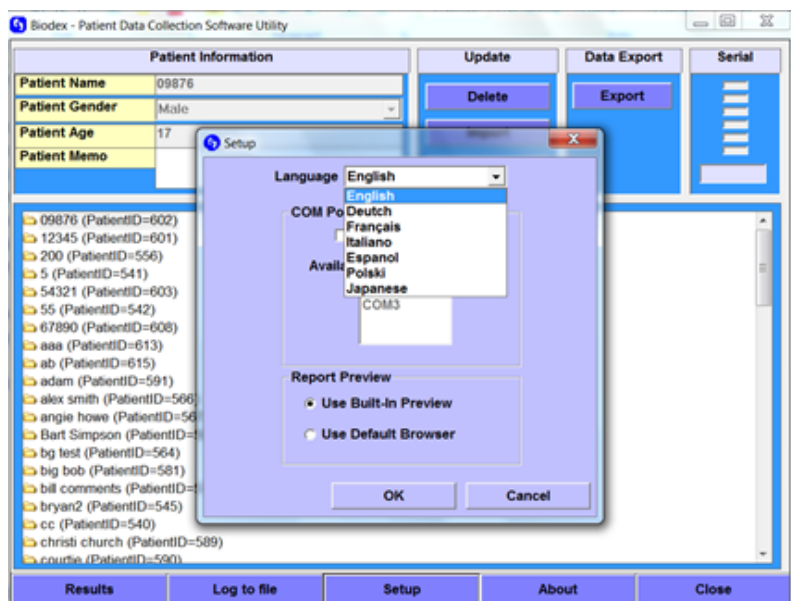
1. Double click on the file "PDCollectionSoftware\_setup\_Vers\_2.0.1.exe" after it has downloaded from the Biodex website.
2. A pop-up window will display and begin the installation sequence.
3. Select the <Next> button and proceed according to the instructions given on screens.



**Figure 3.1.** Patient Data Collection Software Utility Installation procedure.

## Setup/ Configuration

1. Language: In the setup screen, select the desired language by clicking on the appropriate selection in the list of available languages. Select from English, German, French, Italian, Spanish, Polish or Japanese.
2. Serial Interface setting: If you intend on using a serial interface for data transfer, enable and select the COM port that will be used from the serial section of the screen. If you have not already done so, connect the serial cable to the serial port on the PC or use the USB adapter and serial cable. Again, a USB flash drive is the simplest method for moving patient files to Patient Data Collection Software from the 12" WinCE display.



**Figure 3.2.** In the setup screen, select the desired language option and COM port if using serial connection for data transfer.

3. Report Preview option: The report view option in the Setup screen provides the choice to view reports directly from the PDC or use a separate browser. The advantage of leaving the selection as "Use Built-in Preview", is that the reports will have a look and feel consistent with the software.



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## 4. Downloading Patient Data from BioSway, Balance System SD or Gait Trainer

On the Patient Management screen of the BioSway, Balance System SD and Gait Trainer, select <Multiple Export> option. Then choose the date range, select <Export Prep>, and choose Serial or USB method. Note here that the USB flash drive export option is only available on 12" WinCE displays.

### Import Data – Serial Interface

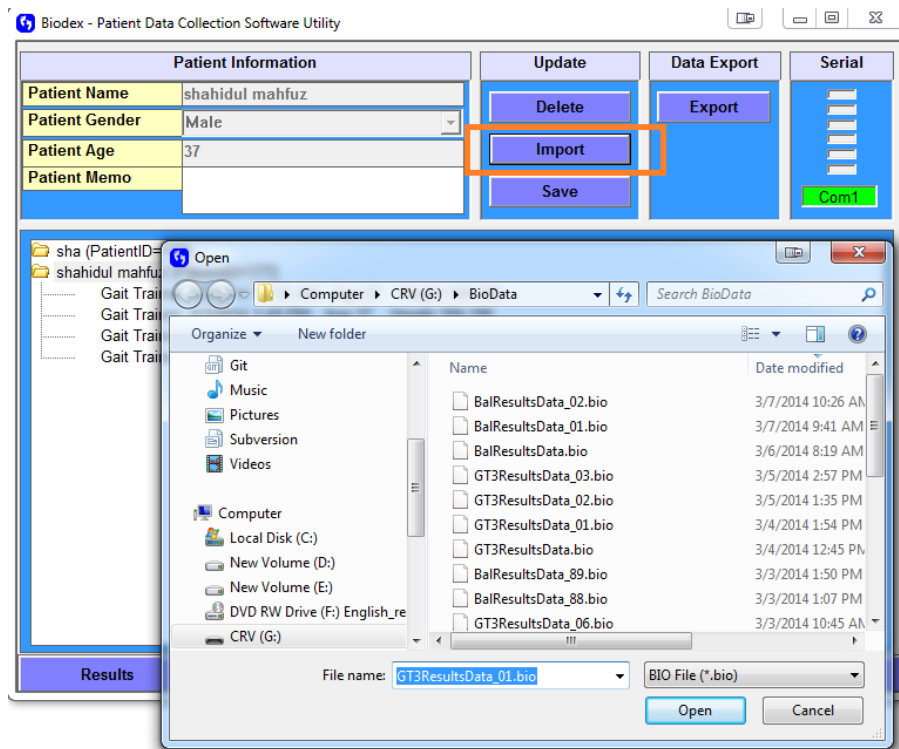
For Serial Interface data transfer, make sure the Patient Data Collection Software Utility (PDC) program is running and confirm the device is properly connected to your computer. Next, select the <Export Serial> option from the BioSway, Balance System SD and Gait Trainer display. It will export the data from the display to the PDC program in real-time.

**NOTE:** *If the test protocols contain normative data that was entered specifically for that test, the exported data will also include that normative data with the test. No additional steps for importing normative data are required. If it cannot find normative, will default to norm data found in the "PDCollection.ini" file located in the PDC installation directory.*

### Import Data - USB

To Import test results from a USB flash drive, go to the main menu of the PDC program and select the <Import> button. Then browse to the BioData folder of the flash drive where the patient data was exported from the display. The patient test results exported to the flash drive will have ".bio" file-extension. Choose the desired file and select <Open>. The file will be imported into the PDC program and it will display the records as a tree view structure.

**NOTE:** *For Balance test data files, if the test protocols contain normative data that was entered specifically for that test, the exported data will also include a file that contains the normative data. This file will have an .nrm file extension. You do not need to do anything with these files. They will automatically be included with the .bio files when transferred. If the program cannot find normative data, it will default to the normative data found in the "PDCollection.ini" file located in the PDC installation directory.*



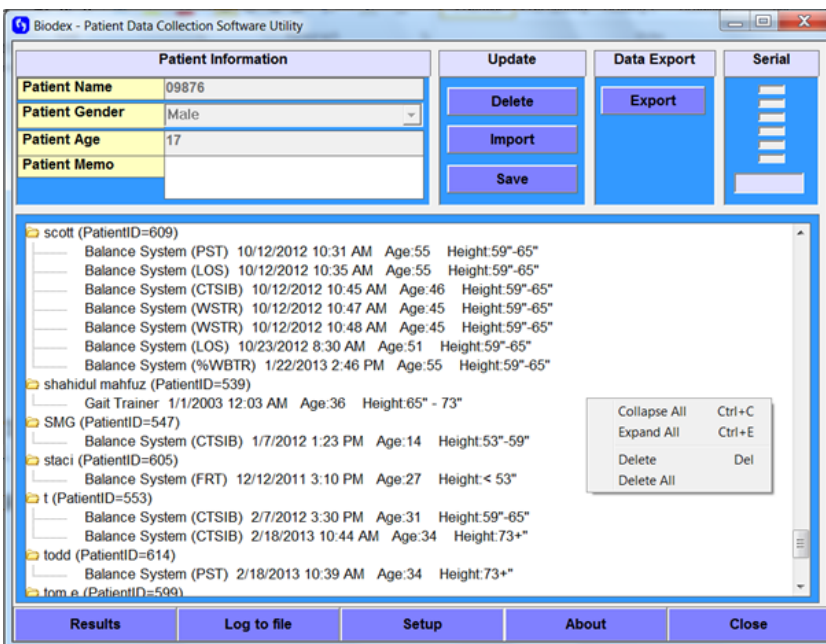
**Figure 4.1.** Import data from USB Flash Drive screen.

Both the Gait and Balance data can be imported into the same PDC program.

## 5. Data Management

### View Data

Once the data is imported into the Patient Data Collection Software Utility (PDC) program, it will display the test results in a tree view structure. Test results are displayed as a subset beneath the folder titled "Patient Name." As long as you maintain the same patient name, new tests exported from either the Gait Trainer, Balance SD or BioSway will automatically be appended to the same patient folder in the PDC software.



*Figure 5.1. To access a specific patient, click on the patient's folder and a list of test records will be displayed.*

A right mouse click will bring up a menu that provides functionality to <Collapse All> (just list as patient folder names) or <Expand All> (show all tests under each patient folder).

### Delete Data

To delete any patient test from the PDC database, select the record to delete first, right click on the mouse and then select <Delete>. The program will prompt for confirmation. Select <Yes> to delete the patient or <No> to cancel and return to the Patient Information screen without deleting the patient. <Delete> option will provide the option to delete either single test or single patient folder (which will delete all subsequent test results for that patient). You can use the <Delete> from right mouse select shortcut or from the main screen <Delete> button.

To delete all the patients and test results, right mouse click and select the <Delete All> option. The program will prompt for confirmation. Click <Yes> to delete the patient or <No> to cancel and return to the Patient Information screen without deleting the patient record.

### Export Data

Data can be exported as a .csv file in two formats:

Export individual test results

Export multiple test results in a single .csv file by test type

Both of these methods will be explained in detail in the following sections of this document.

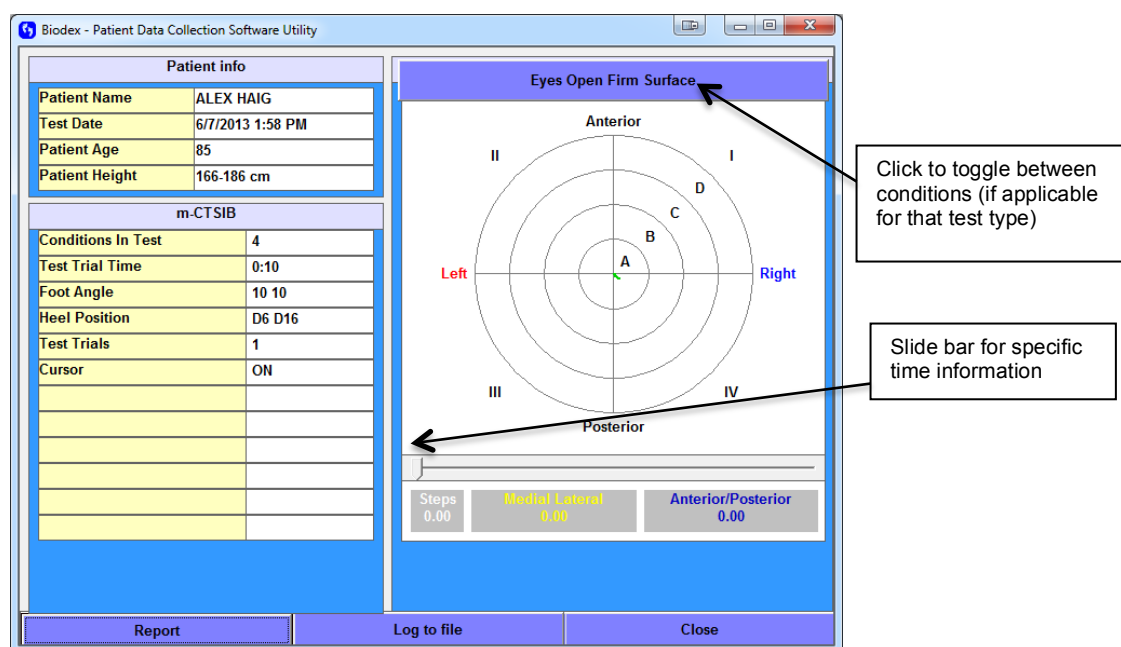
## 6. Viewing Stored Results

The Patient Data Collection Software Utility (PDC) program also provides the ability to view stored results imported from the product display. From the main screen of the PDC program, select <Patient Test Result> first and then select the <Results> button. It will display the results of that test on the screen.

### Balance Stored Results

Figure 6.1 depicts the CTSIB test used for this example. On the left side it displays the patient and test summary information. On the right hand side it displays the traces on the target. Moving the slide bar will display the specific time information. And, for this CTSIB test, clicking the top button will allow you to toggle through each condition.

**NOTE:** Not all test types will have a set of conditions to toggle through.



**Figure 6.1** Balance SD test results.

To view the report of a test result, click on the <Report> button from the above screen.

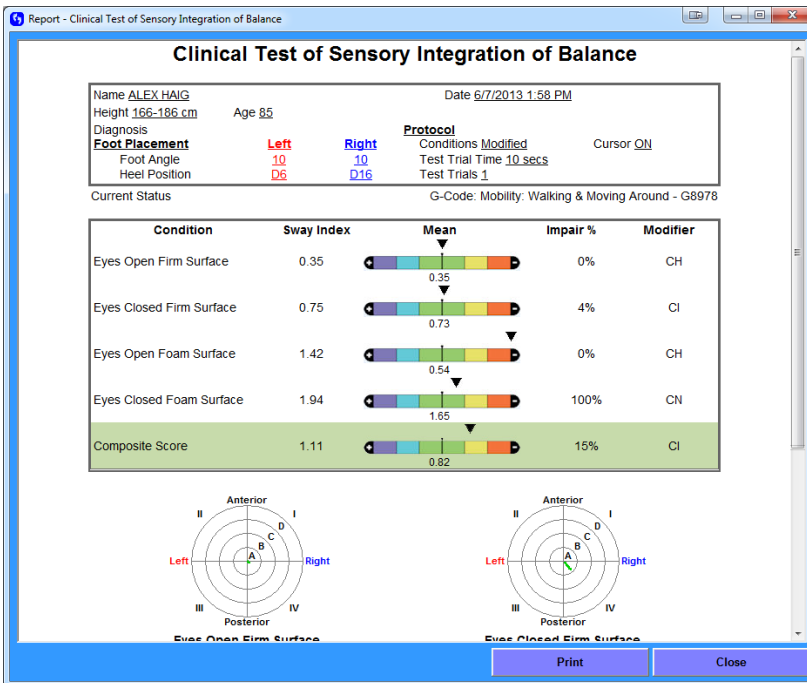


Figure 6.2 Balance SD results viewed as a report.

Select <Print> to print the test result. If printing to PDF is required, a third party tool can be used.

## Gait Trainer Stored Results

On the left side it displays the patient and test summary information. On the right hand side, it displays the traces on the graph. Moving the slide bar will display the specific time information. Other settings on the Exercise Data graph are marked below.

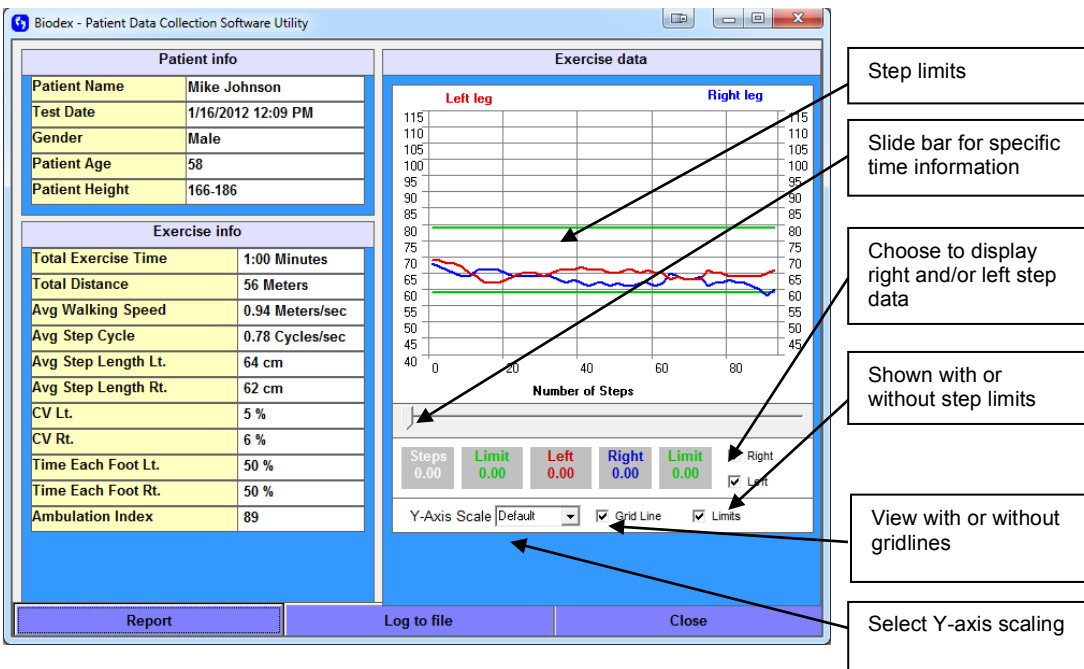
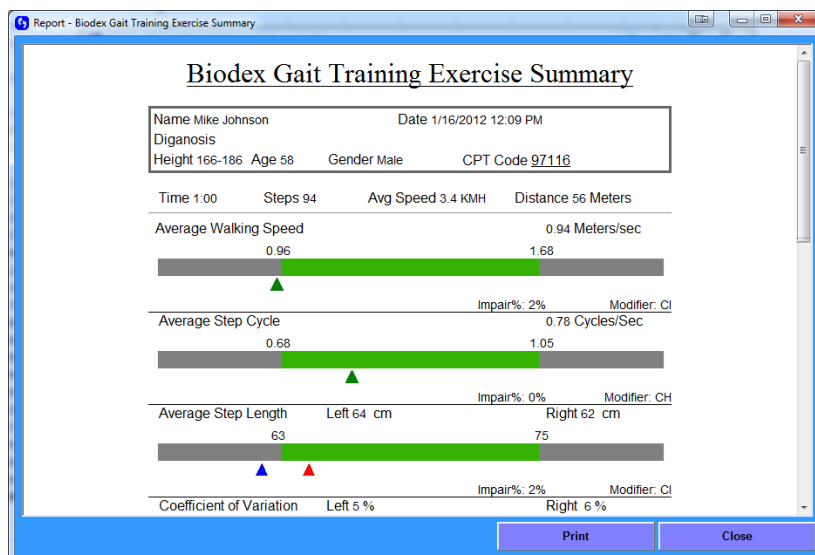


Figure 6.3 Display of Gait Trainer results.

To view the report of the test result, click on the <Report> button from the above screen.



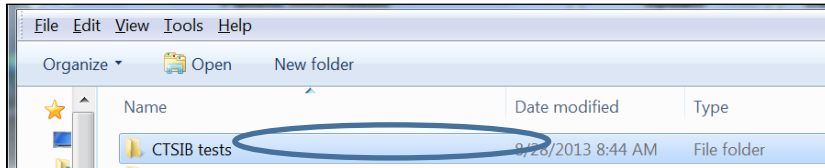
**Figure 6.4** Gait Trainer Results viewed as Report.

Select <Print> to print the test result. If printing to PDF is required, a third party tool can be used.

## 7. Multi Record Data Export as CSV file

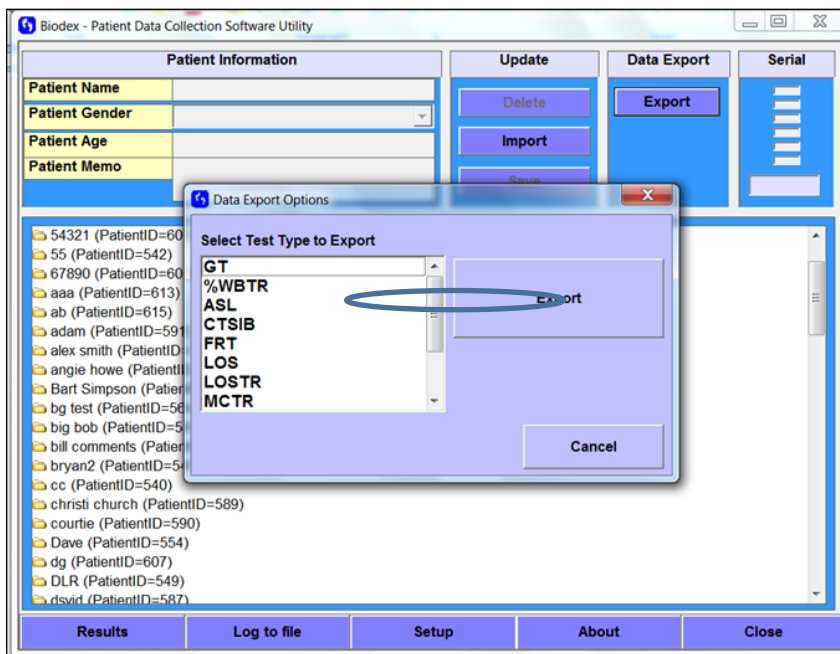
The following will describe how to go about using Patient Data Collection Software Utility (PDC) program to create your own normative data. This option allows the exporting of all patient test results in a single .csv file matching the selected test type for the export option.

First, create separate folders on your computer for each test type.



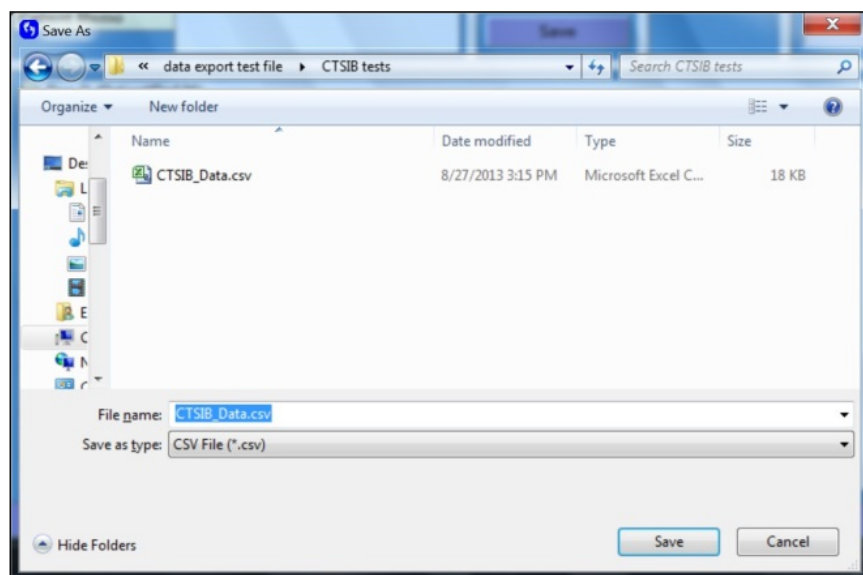
**Figure 7.1.** An example of a folder created on the computer where the files will be stored.

Then from the main screen of the PDC program, select the <Export> button. A pop-up menu will appear. Select the type of test to export from the pop-up menu. Then select the <Export> button. For our example, we will export CTSIB tests. This makes it easy to get the CTSIB data exported as a .csv file into Excel.



**Figure 7.2.** Example of selecting CTSIB tests to be exported.

Save it in the CTSIB results folder.



**Figure 7.3.** CTSIB .csv file to be saved in CTSIB test folder.

Now the file can be opened with .csv compatible program like Excel. When you open the CTSIB file, all of the CTSIB patient test results will be there.

CTSIB_Data.csv - Microsoft Excel																						
File Home Insert Page Layout Formulas Data Review View Acrobat																						
A1 N Pfx Name A R W B																						
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Name	Date	Height	Age	Trial Tim	Foot Ang	Heel Pos	Trial Count	Cursor	Device	Sway 1	Sway 2	Sway 3	Sway 4	Sway 5	Sway 6	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6
2	my norm	9/29/2012 11:20	59"-65"	50	10	0	10	06 D16	1 OFF	Bal SD	1.19	1.27		2.08	0.87		0.48	0.99	0.88	0.71	2.22	1.47
3	student	9/7/2013 15:18	59"-65"	19	20	0	10	06 D16	1 OFF	Bal SD	2.09	1.06		1.41	2.05		0.48	0.99	0.88	0.71	2.22	1.47
4	russell c	3/20/2012 15:39	65"-73"	35	30	0	10	06 D16	1 OFF	Bal SD	0.95	1.01		1.21	3.36		0.48	0.99	0.88	0.71	2.22	1.47
5	suzette	3/20/2012 16:04	53"-59"	34	30	0	10	E7 E15	1 OFF	Bal SD	0.73	1.18		1.21	3.36		0.48	0.99	0.88	0.71	2.22	1.47
6	dave	3/23/2012 14:28	73"+	39	30	0	10	C5 C17	1 OFF	Bal SD	0.33	0.79		0.54	0.91		0.48	0.99	0.88	0.71	2.22	1.47
7	murphy7254	3/23/2012 16:57	53"-59"	61	30	0	10	E7 E15	1 OFF	Bal SD	0.64	2.11		1.32	4.87		0.48	0.99	0.88	0.71	2.22	1.47
8	elli0574	3/23/2012 17:22	53"-59"	91	30	0	10	E7 E15	1 OFF	Bal SD	0.96	3.16		4.29	3.69		0.48	0.99	0.88	0.71	2.22	1.47
9	green3927	3/23/2012 17:44	53"-59"	88	30	0	10	E7 E15	1 OFF	Bal SD	2.77	5.28		2.43	2.58		0.48	0.99	0.88	0.71	2.22	1.47
10	carpenter200K	3/23/2012 17:44	65"-73"	88	30	0	10	D6 D16	1 OFF	Bal SD	2.23	2.38		2.06	2.24		0.48	0.99	0.88	0.71	2.22	1.47
11	carpenter200K	9/27/2012 12:41	65"-73"	89	20	0	10	D6 D16	1 OFF	Bal SD	1.82	1.95	0				0.48	0.99	0.88	0.71	2.22	1.47
12	sato4325	3/23/2012 17:50	53"-59"	78	30	0	10	E7 E15	1 OFF	Bal SD	0.96	3.52		2.1	6.56		0.48	0.99	0.88	0.71	2.22	1.47
13	mac3783	3/23/2012 17:58	59"-65"	72	30	0	10	D6 D16	1 OFF	Bal SD	1.15	1.4		1.65	3.77		0.48	0.99	0.88	0.71	2.22	1.47
14	finley3789	3/23/2012 18:07	< 53"	86	30	0	10	F7 F15	1 OFF	Bal SD	0.93	0.59		2.27	5.99		0.48	0.99	0.88	0.71	2.22	1.47
15	kuwaye8902	3/23/2012 18:22	< 53"	91	30	0	10	F7 F15	1 OFF	Bal SD	2.25	2.5		2.27	5.99		0.48	0.99	0.88	0.71	2.22	1.47
16	reinde89794	3/23/2012 18:30	< 53"	81	30	0	10	F7 F15	1 OFF	Bal SD	2.13	1.16		2.27	5.99		0.48	0.99	0.88	0.71	2.22	1.47
17	singh8300	3/23/2012 18:41	53"-59"	76	30	0	10	E7 E15	1 OFF	Bal SD	0.61	1.02		1.25	3.38		0.48	0.99	0.88	0.71	2.22	1.47
18	bailey3583	3/23/2012 19:56	53"-59"	80	30	0	10	E7 E15	1 OFF	Bal SD	1.21	1.34		2.02	3.86		0.48	0.99	0.88	0.71	2.22	1.47
19	gounson1522	3/23/2012 19:09	< 53"	89	30	0	10	F7 F15	1 OFF	Bal SD	1.13	2.95		2.54	2.76		0.48	0.99	0.88	0.71	2.22	1.47
20	vahle6625	3/23/2012 19:16	< 53"	86	30	0	10	F7 F15	1 OFF	Bal SD	1.44	1.34		2.51	4.1		0.48	0.99	0.88	0.71	2.22	1.47

**Figure 7.4.** Display of .csv file data opened in Microsoft Excel.

It is suggested that the data columns that are not needed be deleted or hidden. The statistical analysis can easily be done on this data.



	A	B	C	D	E	F	G	H	I
1	Name	Date	Height	Age	Sway 1	Sway 2	Sway 4	Sway 5	
2		2/20/2012 15:39	65"-73"	35	0.95	1.01	1.21	3.36	
3		2/20/2012 16:04	53"-59"	34	0.73	1.18	1.21	3.36	
4		2/23/2012 14:28	73+"	39	0.33	0.79	0.54	0.91	
5		2/23/2012 16:57	53"-59"	81	0.64	2.11	1.32	4.87	
6		2/23/2012 17:22	53"-59"	91	0.96	3.16	4.29	3.69	
7		2/23/2012 17:34	53"-59"	88	2.77	5.28	2.43	2.58	
8		2/23/2012 17:44	65"-73"	88	2.23	2.38	2.06	2.24	
9		2/23/2012 17:50	53"-59"	78	0.96	3.52	2.1	6.56	
10		2/23/2012 17:58	59"-65"	72	1.15	1.4	1.65	3.77	
11		2/23/2012 18:07	< 53"	86	0.93	0.59	2.27	5.99	
12		2/23/2012 18:22	< 53"	91	2.25	2.5	2.27	5.99	
13		2/23/2012 18:30	< 53"	81	2.13	1.16	2.27	5.99	
14		2/23/2012 18:41	53"-59"	76	0.61	1.02	1.25	3.38	
15		2/23/2012 18:56	53"-59"	80	1.21	1.34	2.02	3.86	
16		2/23/2012 19:09	< 53"	89	1.13	2.95	2.54	2.76	
17		2/23/2012 19:16	< 53"	86	1.44	1.34	2.51	4.1	
18			Average	74.6875	1.27625	1.983125	1.99625	3.963125	
19			Std Dev	19.33171	0.67802	1.217599	0.819313	1.515564	
20									
21									

**Figure 7.5.** Data columns that are not of interest should be deleted.

The above screenshot displays the final format after the necessary modification has been made to the original .csv file. We calculated the Average and the Standard Deviation from Sway indexes (which can be used as a normative value) and can be entered into the Balance product software (BioSway and/or SD).

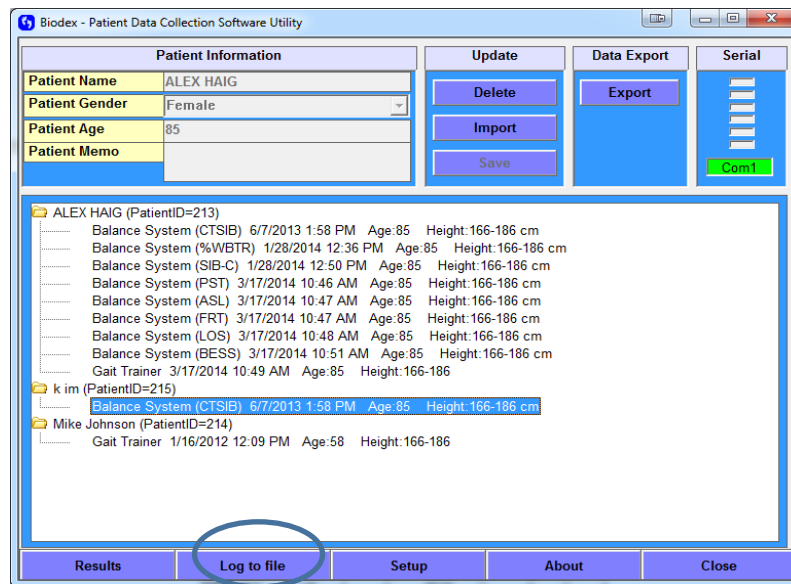
Refer to the sections in the Balance SD or BioSway manuals for entering normative data values into those devices.

Tip for Excel users: To preserve cell formatting, file must be saved as an Excel file.

## 8. Single Record Data Export as CSV file

Another way to save the test results of a .csv file is to use the “Log to file” option. Using the <Log to file> button provides a means to present the test record as raw data. This works on a single test/training/exercise selected record. Row and column headings may vary due to test/exercise performed. The settings of G-Code for each test will vary the column and row heading as well. In these examples, we will use Balance test results without G-code data and Gait Trainer results with a G-Code column to cover both scenarios.

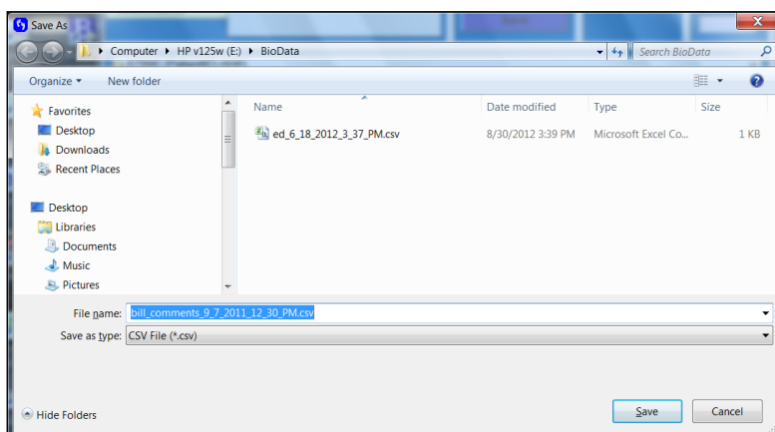
From the main screen of the Patient Data Collection Software Utility (PDC) program, select the desired patient’s test record, and then select the <Log to file> option.



**Figure 8.1** Display of selecting a CTSIB test for Log to file.

### Balance Test Log to file

Once you have clicked on the <Log to file> button, a pop-up dialog box will appear with a default file name and .csv file type. If needed, you can change the name of the file. For this example, the selected test is a CTSIB Test. The file will be exported as .csv file. The data is raw values. This test was not performed with G-Code option turned on in the Balance display and thus will not have those fields.



**Figure 8.2** Display of selected Log to file test as .csv file.

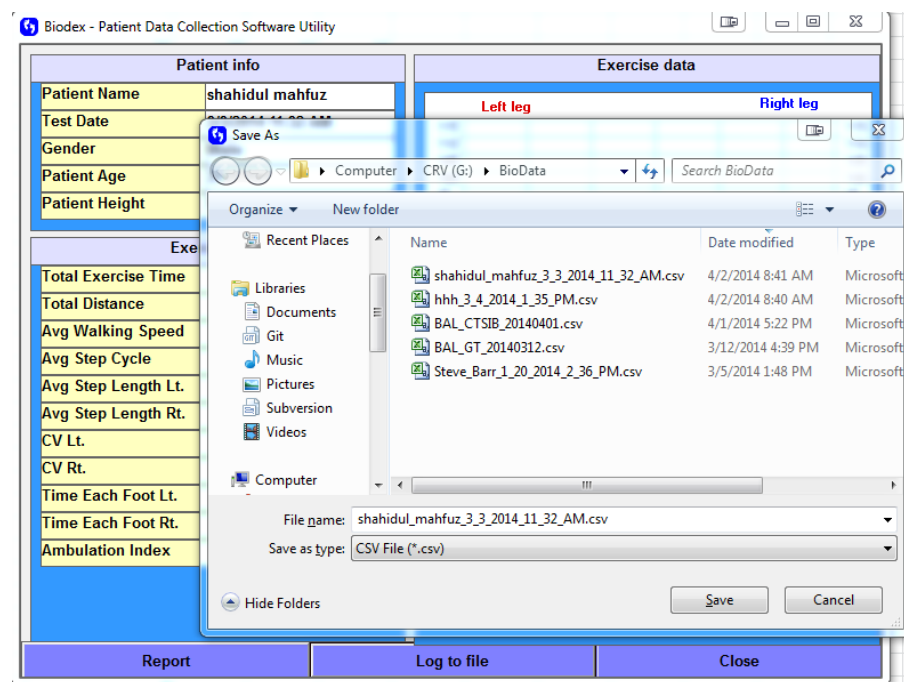
Sample .csv file output using the Log to file operation.

	A	B	C	D	E	F	G	H
1	Biodex Balance System Data							
2	950-440-E617 3.01 03/14/2014							
3	UName	6b		69	6d			
4	Date	6/7/2013 1:58:00 PM						
5	Height	53"-59"						
6	Age	33						
7	PlatformSet	0		0				
8	ElapsedTime	0						
9	SkillLevel	0						
10	Type	CTSIB						
11	Gender	0						
12	CPTCode	OFF						
13	UnitAddress	00 0B AB 32 30 F2						
14	TrialTime	20						
15	FootAngle	10	10					
16	HeelPos	E7	E15					
17	Trials	1						
18	CursorON	1						
19	Dynamic	0						
20	CTSIB	17	72	0.35	0.14	0.73	0.2	0.67
21	SwayIndex	0.94						
22	StabilityIndex	1.3						
23	TrailCnts	0	400	0	0	0	0	
24	Data start	0	1					
25	-61	36						
26	-49	36						
27	-49	49						
28	-36	49						
...	...	...						
...	...	...						
419	-12	-220						
420	0	-233						
421	0	-257						
422	0	-245						
423	0	-245						
424	0	-245						
	Data end							

This sample .csv file will be used in next topic ("CSV file format explanation") to describe how to interpret the .csv file.

## Gait Trainer results Log to file

Once you clicked on the <Log to file> button, a pop-up dialog box will appear with a default file name and file type as .csv. If needed, change the name or leave it as it is. For this example, the selected Gait Trainer Test will be exported as a .csv file. The data is raw values. This test was performed with G-Code option turned on in the Gait Trainer display and thus will have those additional fields in the .csv file.



**Figure 8.3** Gait Trainer Results Log to file.

Sample .csv file output using the Log to file operation (with G-code data)

	A	B	C	D	E
1	Username	Shahidul Mahfuz			
2	Biodex Gait Training Data				
3	950-400-E617 2.01 3/14/2014				
4	UName	53	68	61	68
5	Date	3/3/2014 11:32			
6	Height	166-186			
7	Age	37			
8	Gender	Male			
9	TotExTime	47			
10	TotDist	36			
11	AveWalkingSpeed	1.1	1.82	0.77	
12	AveStepCycle	0.76	1.12	0.61	
13	AveStepLength	0.63	0.75	0.65	0.69
14	CoefVar	6	5		
15	TimeEachFoot	49	51		
16	AmbIdx	0			
17	InitStepLen	138			
18	ToleranceRange	10			
19	HistogramX	0			
20	NumberSteps	59			
21	CPTCode	97710			
22	Comments	Patient's Gait is improving day by day			
23	ICD9Code	icd-0-1111			
24	Diagnosis	Injury from Car accident			
25	UnitAddress	0 0 0 0 0 0			
26	GCodeResultOption	1			
27	GCodeCategory	0			
28	GCodeStatus	0			
29	AvgWalkingSpeedImpairment	33			
30	AvgStepCycleImpairment	1			
31	AvgStepLengthImpairment	0			
32	VarianceImpairment	0			
33	TimeOnEachFootImpairment	0			
34	AvgWalkingAmendmentReason	---			
35	AvgStepCycleAmendmentReason	External Support			
36	AvgStepLengthAmendmentReason	---			
37	VarianceAmendmentReason	---			
38	TimeOnEachFootAmendmentReason	---			
39	Data start				
40	59	60	74	79	
41	59	63	63	79	
42	59	67	67	79	
43	59	63	66	79	
44	59	59	71	79	
...	...	...	...	...	
...	...	...	...	...	
55	59	66	69	79	
56	59	66	71	79	
57	59	65	75	79	
58	Data End				

## 9. CSV File Format Explanation

### Balance Test file format description

To explain the .csv file format, we will use the Balance CTSIB Test results as an example. Similar formats apply to other Balance Test types. Row headings may vary.

The sample CTSIB test results below are for patient: UName: 6b, 69, 6d, performed on June 7<sup>th</sup>. It was a one second trial of "Eyes Closed, Firm Surface."

The .csv file can be divided into two different segments:

1. Device, Patient, Test/Exercise results
2. X, Y Coordinate Data points

### Segment A – Device, Patient, Test/Exercise results

Starting from the top of the file, it displays the device information, then patient information and then different test results. The left column contains the heading/label and the right column(s) displays the corresponding values.

	A	B	C	D	E	F	G	H
1	Biodex Balance System Data							
2	950-440-E617 3.01 03/14/2014							
3	UName	6b		69	6d			
4	Date	6/7/2013 1:58:00 PM						
5	Height	53"-59"						
6	Age	33						
7	PlatformSet	0		0				
8	ElapsedTime	0						
9	SkillLevel	0						
10	Type	CTSIB						
11	Gender	0						
12	CPTCode	OFF						
13	UnitAddress	00 0B AB 32 30 F2						
14	TrialTime	20						
15	FootAngle	10	10					
16	HeelPos	E7	E15					
17	Trials	1						
18	CursorON	1						
19	Dynamic	0						
20	CTSIB	17	72	0.35	0.14	0.73	0.2	0.67
21	SwayIndex	0.94						
22	StabilityIndex	1.3						
23	TrialCnts	0	400	0	0	0	0	

*Figure 9.1 CSV file format explanation.*

Here is a brief description of each row/field.

Field Heading	Description
<b>Username</b>	The patient's name. This field is only present in USB exported records, not serial exported records (example above is from a serial export).
<b>UName</b>	This is the patient's name in hex Unicode format. Each letter of the name is separated by a comma and is coded in Hex format to represent the ASCII character. This was done to accommodate all supported languages, such as Polish and Japanese.
<b>Date</b>	The date/time the test or training exercise was performed.
<b>Height</b>	The selected patient height.
<b>Age</b>	The entered patient age.
<b>PlatformSet</b>	Initial and Ending Platform settings. 0= Not applicable to CTSIB.
<b>ElapsedTime</b>	0 = Not applicable to a CTSIB test.
<b>SkillLevel</b>	0 = Not applicable to a CTSIB test.
<b>Type</b>	Set to CTSIB for a CTSIB test.
<b>Gender</b>	Male = 0, Female = 1
<b>CPTCode</b>	ON or OFF (if CPT Codes were used/saved with this result)
<b>Comments</b>	Comments entered with test results (optional)
<b>Diagnosis</b>	Diagnosis commentary entered with test results (optional)
<b>UnitAddress</b>	Unique identifier of the Balance unit tested on (MAC address)
<b>TrialTime</b>	Configured length of time per trial in seconds.
<b>FootAngle</b>	Configured Foot Angles (2 numbers) from Position Patient screen entry.
<b>HeelPos</b>	Configured Heel Positions (2 fields) from Position Patient screen entry.
<b>Trials</b>	Configured number of trials selected for this test.
<b>CursorON</b>	Configured cursor viewing, where 0=OFF, 1=ON.
<b>Dynamic</b>	0 = Not currently used by a CTSIB test.
<b>CTSIB</b>	<p>This is the normative data in effect for this test. The first two fields are the minimum and maximum ages respectively. Following are 12 numbers representing the minimum and maximum sway index values per condition. The order of the condition is the same as listed on screen and is as follows:</p> <p>Eyes Open Firm Surface  Eyes Closed Firm Surface  Visual Conflict Firm Surface  Eyes Open Foam Surface  Eyes Closed Foam Surface  Visual Conflict Foam Surface</p>
<b>SwayIndex</b>	The resulting Sway Index scores of the number of conditions tested.
<b>StabilityIndex</b>	The resulting Stability Index scores of the number of conditions tested.

<b>TrialCnts</b>	<p>This field contains 6 numbers for the maximum number of conditions, in order as listed on page 22. If a number is non-zero, this means this condition was included in the test. The value of each field is the number of data points collected per condition tested and included in this test result. For example:</p> <p style="text-align: center;">600,600,0,600,600,0</p> <p>These numbers mean condition #1, #2, #4 and #5 were tested and 600 data points were collected for each tested condition, resulting in a total of 2,400 X, Y data points. The X, Y data points are always in sequence order of the conditions, following the order listed above under the CTSIB field description. Within each set of data points per condition, it is in time sequence order.</p>
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## Specific information for other Balance test types

In addition to CTSIB, the following Field Headings are fields that are specific to the other test types.

### Postural Stability Test

Field Heading	Description
<b>Type</b>	Set to PST for a Postural Stability Test
<b>StanceIndex</b>	Foot stance: 0=Left foot, 1=Right foot, 2=Both feet
<b>OverallL</b>	Overall Stability Index and Standard Deviation scores (Left or Both Stance)
<b>AnteriorPostL</b>	Anterior/Posterior Stability Index and Standard Deviation scores (Left or Both Stance)
<b>MedialLatL</b>	Medial Lateral Stability Index and Standard Deviation (Left or Both Stance)
<b>ZonesL</b>	% Time in zones (A through D)
<b>QuadsL</b>	% Time in Quadrant (I through IV)

### Limits of Stability data

Field Heading	Description
<b>SkillLevel</b>	1=hardest (largest), 2=moderate, 3=easiest (smallest)
<b>Type</b>	Set to LOS for Limits Of Stability test
<b>StanceIndex</b>	Foot stance: 0=Left foot, 1=Right foot, 2=Both feet
<b>LOS</b>	Actual Scores, in the following order: Overall, Fwd, Bkwd, Left, Right, Fwd/Left, Fwd/Right, Bkwd/Left, Bkwd/Right
<b>Target</b>	9 sets of X, Y coordinates representing the pixel position of each ball shaped target



### Athlete Single Leg data

Field Heading	Description
Type	Set to ASL for Athlete Single Leg test
LegIndex	Leg tested: 0=Left, 1=Right
ASL	Normative Data for Overall Stability Index, Anterior/Posterior Stability Index, and Medial Lateral Stability Index, plus their respective Standard Deviations
Score	Overall Stability Index, as displayed, but in 10ths
OverallL	Overall Stability Index and Standard Deviation scores (Left leg)
AnteriorPostL	Anterior/Posterior Stability Index and Standard Deviation scores (Left Leg)
MedialLatL	Medial Lateral Stability Index and Standard Deviation (Left Leg)
ZonesL	% Time in zones (A through D)
QuadsL	% Time in Quadrant (I through IV)

### Fall Risk data

Field Heading	Description
Type	Set to FRT for Fall Risk Test
FRT	Normative Data – 8 values: the min/max for the 4 age range groups, where each value is in 10ths
OverallL	Overall Stability Index and Standard Deviation scores

## Segment B – X, Y Coordinate Data Points

This segment describes the X, Y coordinate data points. It starts within the record from the “Data start” labeled on the left column and ends when it displays the “Data end”. All test/exercise results will have a “Data start” and “Data end” point. In this example, the data point values displayed as “-61,36” represent the X coordinate value as -61 and the Y coordinate as 36 and so on.

	A	B	C	D	E	F	G	H
24	Data start	0	1					
25	-61	36						
26	-49	36						
27	-49	49						
28	-36	49						
...	...	...						
...	...	...						
419	-12	-220						
420	0	-233						
421	0	-257						
422	0	-245						
423	0	-245						
424	0	-245						
	Data end							

Figure 9.2 CSV file format explanation - data points.

Each point is an X, Y rectangular coordinate, where 0,0 is the center of the graph, to the left is negative X, and to the bottom is negative Y. The data points are generated at a sample rate of 20 per second (i.e., every 50 msecs).

## X,Y Scaling

For all tests and exercises in Dynamic mode (available in Balance SD only), the X,Y coordinate data is scaled to 1/100th degrees for a range of 20 degrees (max value of 2,000) of platform tilt. For tests with the yellow ringed background, each ring represents approximately 5 degrees of platform tilt. For LOS, the furthest out targets (center of target) at the most difficult level represent 8 degrees of platform tilt (value of 800).

For all tests and exercises in Static mode, the X,Y coordinate data is scaled to 1/100th for a range of 20 (max value of 2,000), mapped to 8 degrees of body tilt angle. For example, 8 degrees of body tilt is a value of 2,000, and 2 degrees of body tilt is 500. For tests with the yellow ringed background, each ring represents approximately 2 degrees of body tilt. For LOS, the furthest targets (center of target) at the most difficult level represent 8 degrees of body tilt (value of 2,000).

**NOTE:** Only the last trial's data points are stored. So if there are 3 trials and each trial is 20 seconds and the sample rate is 20hz (20 times per second) then there will only be 400 (X,Y) data points from the third trial stored. The Stability Index and Sway Index, however, will reflect results over all 3 trials.

## Gait Test file format description

Starting from the top of the file, the Gait Test file format displays the device information, patient information, followed by the different test results. Left column contains the heading/label and the right column(s) displays the corresponding values.

For this Gait Trainer example, we included the test/exercise results with G-Code. Any Gait Trainer exercise performed with the G-Code functionality turned on will have additional fields (as shown below.) These fields will be similar but slightly different for the CTSIB test and Percentage Weight Bearing training results of the Balance devices.

	A	B	C	D	E
1	Username	Shahidul Mahfuz			
2	Biodex Gait Training Data				
3	950-400-E617  2.01 3/14/2014				
4	UName	53	68	61	68
5	Date	3/3/2014 11:32			
6	Height	166-186			
7	Age	37			
8	Gender	Male			
9	TotExTime	47			
10	TotDist	36			
11	AveWalkingSpeed	1.1	1.82	0.77	
12	AveStepCycle	0.76	1.12	0.61	
13	AveStepLength	0.63	0.75	0.65	0.69
14	CoefVar	6	5		
15	TimeEachFoot	49	51		
16	AmbIdx	0			
17	InitStepLen	138			
18	ToleranceRange	10			
19	HistogramX	0			
20	NumberSteps	59			
21	CPTCode	97710			
22	Comments	Patient's Gait is improving day by day			
23	ICD9Code	icd-0-1111			
24	Diagnosis	Injury from Car accident			
25	UnitAddress	000000			

Figure 9.5 CSV file format explanation - Gait Trainer Exercise results

Here is a brief description of each row/field.

Field Heading	Description
<b>Username</b>	The patient's name. This field is only present in USB exported records, not serial exported records (example above is from a serial export).
<b>UName</b>	This is the patient's name in hex Unicode format. Each letter of the name is separated by a comma and is coded in Hex format to represent the ASCII character. This was done to accommodate all supported languages, such as Polish and Japanese.
<b>Date</b>	The date/time the test or training exercise was performed.
<b>Height</b>	The selected patient height.
<b>Age</b>	The entered patient age.
<b>Gender</b>	Gender of the Patient.
<b>TotExTime</b>	Total Exercise time in seconds.
<b>TotDist</b>	Total distance of the exercise in meters.
<b>AveWalkingSpeed</b>	Average Walking speed. First two columns display the norm value, and third column displays the actual exercise value.
<b>AveStepCycle</b>	Average Step Cycle. First two columns display the norm value, and third column displays the actual exercise value.
<b>AveStepLength</b>	Average Step Length. First two columns display the norm value, and third column displays the actual exercise value for Right leg and then forth column represents Left leg.
<b>CoefVar</b>	Co efficient Variance in percent. First column displays the value for Right leg and 2nd column displays the value for Left leg.
<b>TimeEachFoot</b>	Time on each foot in percent. First column is for Right and next column represents Left leg value.
<b>AmblIdx</b>	Ambulatory index.
<b>InitStepLen</b>	Initial step length.
<b>ToleranceRange</b>	Tolerance range.
<b>HistogramX</b>	Value for Histogram.
<b>NumberSteps</b>	Number of steps during the exercise.
<b>CPTCode</b>	CPT code (if used) during the exercise.
<b>Comments</b>	Comments for the exercise.
<b>Diagnosis</b>	Diagnosis information. If ICD code is used, first part of the information will contain the ICD code and then diagnosis information followed by a "-".
<b>UnitAddress</b>	Unit address of the device.
<b>GCodeResultOption</b>	G-Code tuned on or off.
<b>GCodeCategory</b>	Category of G-Code.
<b>GCodeStatus</b>	Status of G-Code, 0= Current or 1= Discharge.
<b>AvgWalkingSpeedImpairment</b>	Impairment value of Average Walking Speed.

<b>AvgStepCycleImpairment</b>	Impairment value of Avg Step Cycle.
<b>AvgStepLengthImpairment</b>	Impairment value of of Avg Step Length.
<b>VarianceImpairment</b>	Impairment value of COV.
<b>TimeOnEachFootImpairment</b>	Impairment value of Time on Each foot.
<b>AvgWalkingAmendmentReason</b>	Amendment reason (if any) for Avg walking Speed.
<b>AvgStepCycleAmendmentReason</b>	Amendment reason (if any) for Avg Step Cycle.
<b>AvgStepLengthAmendmentReason</b>	Amendment reason (if any) for Avg Step Length.
<b>VarianceAmendmentReason</b>	Amendment reason (if any) for COV.
<b>TimeOnEachFootAmendmentReason</b>	Amendment reason (if any) for Time on Each foot.

For the Data segment, cell “A” represents Min Tolerance Range, cell “B” represents Step Length on Left foot, cell “C” represents Step Length on Right foot, cell “D” represents Max Tolerance Range.

	A	B	C	D
39	Data start			
40	59	60	74	79
41	59	63	63	79
42	59	67	67	79
43	59	63	66	79
44	59	59	71	79
---	---	---	---	---
---	---	---	---	---
55	59	66	69	79
56	59	66	71	79
57	59	65	75	79
58	Data End			

	(Min Tolerance Range)	(Step Length Left)	(Step Length Right)	(Max Tolerance Range)
--	-----------------------	--------------------	---------------------	-----------------------

**Figure 9.6** CSV file format explanation - sample data point for Gait Trainer test results.

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## 10. Calculation of Stability and Sway Index from the CSV file data

Looking at the file for the CTSIB test that was exported in the previous section, we see the example CTSIB test result below was one 20-second trial of a single condition -- "Eyes Closed Firm Surface".

From the file we can see that the displayed Sway Index is 0.94 and Stability Index is 1.3.

18	CursorUN	1						
19	Dynamic	0						
20	CTSIB	17	72	0.35	0.14	0.73	0.2	0.67
21	SwayIndex	0.94						
22	StabilityIndex	1.3						
23	TrailCnts	0	400	0	0	0	0	

*Figure 10.1 CSV file format calculation.- snippet from original exported .csv file*

The following section will describe the Stability Index and Sway Index. Then we will see how to verify/obtain that same data using the Excel sheet.

### Stability Index

Stability Index = average radial distance from center.

X and Y coordinates are scaled to 2000 to represent the outer ring, where the outer ring has a value of 20. Therefore, just divide results by 100.

The Pythagorean Theorem is used to solve for distance from the center:

Distance (R) = square root of  $(x*x) + (y*y)$

### Sway index

Sway index = standard deviation of the average position.

The standard deviation is the offset from the average position, point by point, then averaging those standard deviations.

## Calculation using formula on Excel sheet

Looking at the Data segment of the .csv file, we will need to include some formulas to calculate the Stability Index and Sway Index. On the Excel sheet, cells “A” and “B” represent original data. In Excel, columns are often referred as “cells”.

	A	B	C	D	E	F	G	H
24	Data start	0	1					
25	-61	36						
26	-49	36						
27	-49	49						
28	-36	49						
...	...	...						
...	...	...						
419	-12	-220						
420	0	-233						
421	0	-257						
422	0	-245						
423	0	-245						
424	0	-245						
	Data end							

**Figure 10.2** CSV file format calculation- Data point segment of the original exported .csv file

1. First, on row 425 of the Excel sheet, find out the total of the individual data point starting from row 24 to row 424 for cell “A” and “B”.

On cell “A” row 425 use the following formula:  
=SUM(A25:A424)

	A	B	C	D
24	Data start	0	1	
25	-61	36	70.83078	18671.619
26	-49	36	60.80296	18429.759
27	-49	49	69.29646	22126.829
28	-36	49	60.80296	22189.814
419	-12	-220	220.327	15557.184
420	0	-233	233	19788.254
421	0	-257	257	26762.894
422	0	-245	245	23131.574
423	0	-245	245	23131.574
424			245	23131.574
425	=SUM(A25:A424)			

On cell “B” row 425 use the following formula:

=SUM(B25:B424)

	A	B	C	D
24	Data start	0	1	
25	-61	36	70.83078	18671.619
26	-49	36	60.80296	18429.759
27	-49	49	69.29646	22126.829
28	-36	49	60.80296	22189.814
419	-12	-220	220.327	15557.184
420	0	-233	233	19788.254
421	0	-257	257	26762.894
422	0	-245	245	23131.574
423	0	-245	245	23131.574
424	0			23131.574
425	-17969	=SUM(B25:B424)		

**Figure 10.3** CSV file format calculation.- finding the total of individual data points

**NOTE:** For better representation, we hid some rows in above snapshots, in original calculation it is not required.

- In cell “C” (row number 25), use the following formula to find the Stability Index for each data point (starting from 1st data point to end data point):

=SQRT(A25\*A25+B25\*B25)

	A	B	C	D
24	Data start	0	1	
25	-61	36	=SQRT(A25*A25+B25*B25)	

**Figure 10.4** CSV file format calculation.- using formula to calculate Stability Index for each data point

- In cell “D” (row number 25), use the following formula to find the Sway Index for each data point (starting from 1st data point to end data point):

=((A25-\$A\$425/400)\*(A25-\$A\$425/400))+((B25-\$B\$425/400)\*(B25-\$B\$425/400))

	A	B	C	D
24	Data start	0	1	
25	-61	36	70.83078427	=((A25-\$A\$425/400)*(A25-\$A\$425/400))+((B25-\$B\$425/400)*(B25-\$B\$425/400))

**Figure 10.5** CSV file format calculation.- using formula to calculate Sway Index for each data point

- Finally, to find the Stability Index value, use the following formula which takes the average of all the data points in cell "C".

=AVERAGE(C25:C424)/100, using this formula output is 1.32

	A	B	C	D	E
24	Data start	0	1		
25	-61	36	70.83078427	18671.619	
26	-49	36	60.80296045	18429.759	
27	-49	49	69.29646456	22126.829	
28	-36	49	60.80296045	22189.814	
419	-12	-220	220.3270297	15557.184	
420	0	-233	233	19788.254	
421	0	-257	257	26762.894	
422	0	-245	245	23131.574	
423	0	-245	245	23131.574	
424	0	-245	245	23131.574	
425	-17969	-39878			
426					
427					
428			=AVERAGE(C25:C424)/100		
429			AVERAGE(number1, [number2], ...)		
430			Stability Index Sway Index		

**Figure 10.6** CSV file format calculation.- using formula to calculate Stability Index

To find the Sway Index value, use the following formula which takes the sum of all the data points on cell "D".

=SQRT(SUM(D25:D424)/400)/100, using this formula output is 0.938

	A	B	C	D	E	F
24	Data start	0	1			
25	-61	36	70.83078427	18671.619		
26	-49	36	60.80296045	18429.759		
27	-49	49	69.29646456	22126.829		
28	-36	49	60.80296045	22189.814		
419	-12	-220	220.3270297	15557.184		
420	0	-233	233	19788.254		
421	0	-257	257	26762.894		
422	0	-245	245	23131.574		
423	0	-245	245	23131.574		
424	0	-245	245	23131.574		
425	-17969	-39878				
426						
427						
428			1.320717826	=SQRT(SUM(D25:D424)/400)/100		
429				SQRT(number)		
430			Stability Index Sway Index			

**Figure 10.7** CSV file format calculation.- using formula to calculate the Sum of all Sway Indexes

Where, 400 = the number of samples and 100 = the scale factor



5. The final output looks like the following once we use all the formulas above which match the value of Stability Index and Sway Index shown in the exported .csv file.

	A	B	C	D	E
24	Data start	0	1		
25	-61	36	70.83078427	18671.619	
26	-49	36	60.80296045	18429.759	
27	-49	49	69.29646456	22126.829	
28	-36	49	60.80296045	22189.814	
419	-12	-220	220.3270297	15557.184	
420	0	-233	233	19788.254	
421	0	-257	257	26762.894	
422	0	-245	245	23131.574	
423	0	-245	245	23131.574	
424	0	-245	245	23131.574	
425	-17969	-39878			
426					
427					
428			1.320717826	0.93838843	
429					
430			Stability Index	Sway Index	
431					

**Figure 10.8** CSV file format calculation.- final results

**NOTE:** There are hundreds of rows of data for the .csv file. This example only shows a few rows and the resulting calculated values.

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## 11. Troubleshooting

**Problem:** A new folder is being created for the same patient.

**Solution:** Most likely there is some subtle difference in the name. Check spelling and use of spaces, punctuation, etc.

**Problem:** Report is viewed on screen, but will not print.

**Solution:** The report is viewed using Window's Explorer. Printing problems are most likely related to the printer setup. Confirm that the correct printer is selected and installed in the Windows program and check the cable connections of the printer to the computer. If the printer was not connected to the computer when you powered-up the computer, it may be necessary to restart the computer with the printer connected.



**BIODEX**

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